

# Theodore Roosevelt National Park Northwest Corner Prescribed Fire Monitoring Report

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## Introduction

The North West Corner prescribed fire is an 834 acre unit comprised of both native and non-native mixed grass prairie with isolated pockets of Green Ash woody draws. It is located in the Northwest corner of the north unit of Theodore Roosevelt National Park. The boundary of the burn area consists of Park boundary on the west and north perimeter and the Scenic road on the south and east perimeter. Ignition occurred during the operational periods of October 18, 20, and 21, 2001.

Overhead personnel for the Northwest Corner burn consisted of Burn Boss Gary Kiramidjian with Beth Card acting as Burn Boss Trainee, Ignition Specialist Ron Twiss with Jay Vogelsang as Ignition Specialist Trainee, Holding Specialist Doug Alexander, and Division Supervisors, LJ Brown and Rick Willoughby. Holding forces included fourteen Type 6 Engines, 4 ATV's, and one Type III water tender. Resources were from The National Park Service, The United States Forest Service, US Fish and Wildlife Service, and Watford City Rural Fire Department.

## Objectives

The Burn plan stated these as primary resource objectives for the burn:

- ❖ Increase native grass and forb cover.
- ❖ Restore the natural role of fire to the ecosystem.
- ❖ Reduce fuels in the deciduous understory in the woody draws.
- ❖ Reduce 1-hr dead & down fuels in prairie by at least 70% immediate postburn.

General goals for the prescribed fire were to decrease decadent thatch to create openings for young, more nutritious vegetation growth that should improve native perennial forb vigor and wildlife foraging habitat in the area. The burn will also create small openings in the hardwood canopy and fertile beds of nutrient-rich ash to promote new deciduous regeneration. Fire behavior and effects will be closely monitored using NPS fire monitoring protocols.

## Summary of Events

Prior to the day of the burn, personnel from Theodore Roosevelt National Park constructed a mow line that followed the fence line of the park boundary along the northern and western perimeter of the burn unit. The unit was sectioned off into three individual blocks by use of mow line to allow the fire to be held at the block edge.

Three long-term fire effects monitoring plots were installed randomly within the burn unit prior to the burn. Relative cover of native and non-native grass, forbs, and shrubs were sampled during the peak growing season in July. Biomass, fuel and soil moistures were sampled within the monitoring plots one day prior to the burn.

The Northwest Corner prescribed fire required four operational periods: Three days of ignition, and one day of staging when winds were predicted to be outside the prescription parameters. The multi-day operational burn was a direct result of weather and a shortened burn window due to short days. A briefing was conducted for all personnel at 0700 on the morning of the burn. A National Weather Service spot forecast and on-site weather observations were obtained to assess compliance with prescription parameters.

## Weather Observations

Monitoring of weather conditions for the Northwest Corner Prescribed Fire began in the morning to obtain a spot weather forecast from the National Weather Service. Spot weather forecasts were received around

0900 before ignition began. As of 0900, observations were generally taken every half hour until ignition was completed for the day. Observations were broadcast on the hour over the command channel for all fire personnel.

Observed and predicted weather conditions are summarized in Table 1.

**Table 1A, Weather Conditions Observed on 10/18/01**

Condition	Temperature	Relative Humidity	Wind Speed (mph)	Wind Direction	1-Hr Fuel Moisture
<b>Prescription</b>	n/a	20-60%	1-8	any	6-11%
<b>Predicted</b>	54	Min 25%	15mph gusts to 28	W	Minimum 6
<b>Observed</b>	38-53	27-62%	10-15 gusts to 30	W	6-10

**Table 1B, Weather Conditions Observed on 10/20/01**

Condition	Temperature	Relative Humidity	Wind Speed (mph)	Wind Direction	1-Hr Fuel Moisture
<b>Prescription</b>	n/a	20-60%	1-8	any	6-11%
<b>Predicted</b>	55	38%	5-15 not to exceed 20 mph	WNW	Minimum 7%
<b>Observed</b>	40-55	41-56	3-8 gusts up to 10	W/NW	7%

**Table 1C, Weather Conditions Observed on 10/21/01**

Condition	Temperature	Relative Humidity	Wind Speed (mph)	Wind Direction	1-Hr. Fuel Moisture
<b>Prescription</b>	n/a	20-60%	1-8	any	6-11%
<b>Predicted</b>	45-50	Min 40-50%	light	variable	
<b>Observed</b>	35-57	33-67%	2-8	SE/SW	Min 6%

### **Ignition Pattern**

On October 18<sup>th</sup>, ignition began at 1015 at a Canada thistle research plot. It took approximately one hour to complete the ignition on the research plot. The ignition team then moved to the northeast corner of the unit and began firing at 1200. Ignition continued along the east mow line until strong winds at 1330 hours caused 3 spot fires and halted ignition. On October 20<sup>th</sup>, 2 ignition teams commenced; one at the southeast corner along the road and one at the northeast corner along the Park boundary fence. These teams progressed in a westerly direction, eventually meeting at the south west corner of Block A at approximately 1600. On October 21<sup>st</sup>, ignition followed much the same pattern with 2 ignition teams; one along the north boundary fence and one along the road on the southeast. Teams progressed westerly on their respective perimeters with an ATV driptorch filling in the center of the block. The ignition teams met at the southwest corner at approximately 1800.

### **Fire Behavior Observations**

Fire behavior observations were taken regularly during each day in different fuel types. Fire behavior was recorded on 3 fire effects plots within the burn unit. Fire behavior observations are summarized in Table 2.

**Table 2, Fire Behavior Observed on 10/18/01**

Time	Fuel Model	Fire Type	Rate of Spread (ch/hr)	Flame Length	Flame Zone Depth	Comments
1015	snowberry	head/flank	18	1-5'	1-2'	Test fire in thistle and snowberry
1230	1 brome	Backing	2	1-2'	12"	10-15 mph wind
1300	1 stipa	Flanking	3	6-8"	4"	

**Table 2A, Fire Behavior Observed on 10/20/01**

Time	Fuel Model	Fire Type	Rate of Spread (ch/hr)*	Flame Length	Flame Zone Depth	Comments
1035	1 native grass	backing	½	2-6"	2"	Some parts of perimeter extinguished
1530	Mix shrub and grass	backing	2	12"	6-12"	
1225	1 brome	flanking	2	6"-24"	1'	60% shading
1010	1	head	36	6-8'	20'	20' strips at test fire
1225	1 mixed native grass	head	60	4-5'	20'	Fire effects plot 6

**Table 2B, Fire Behavior Observed on 10/21/01**

Time	Fuel Model	Fire Type	Rate of Spread (ch/hr)*	Flame Length	Flame Zone Depth	Comments
1315	Western wheat	backing	2	6"-18"	4"-6"	Fire beginning to carry continuously
1645	Mixed native grass	backing	1 ½	2"-6"	4"	
1730	Mixed grass	flanking	12	3'	18"	
1400	Mixed grass	head	60	4'-5'	10'	
1550	bluestem	head	200	8'	20'+	Uphill south aspect
1620	Mixed grass	head	60	6'-8'	6'-10'	
1740	stipa	head	60-80	6'-8'	8'	Fire effects plot 5

**Biomass and Soil Moisture Measurements**

Fuel loading and soil moisture samples were taken at the long term monitoring plots on the day before the burn. Three samples of a known area were clipped to determine biomass or fuel loading by tons per acre. The sample fuel loading was on average 2.08 tons per acre and varied from 2.02 to 2.12 tons/acre in the prairie areas. Three soil moisture samples were taken within 5cm of the surface at each of the five plots. Samples were weighed and dried to obtain a mean soil moisture for the unit. The average soil moisture was 9.40% in the prairie ranging between 9.03% to 10.03%.

### **Smoke Monitoring**

Smoke impacts from the Northwest Corner prescribed fire were monitored periodically throughout the active burning period. The main concern for smoke impacts was the Park road which formed the south perimeter of the fire. On October 18<sup>th</sup>, smoke moved predominantly to the northeast staying near the ground and volumes that day was light. On the 20<sup>th</sup>, smoke was moving across the roadway in the morning and limiting visibility. By afternoon, the smoke rose above 500 feet and visibility was unimpaired. On the 21<sup>st</sup>, southwest winds and good dispersal kept smoke lofting to the north. Some smoke impacts were noticed at a ranch west of the burn at sunset as smoke began to settle in drainages and flow to the west.

### **Fire Monitoring**

Three long-term fire-monitoring plots are located within the Northwest Corner burn unit. The three plots are mixed grass native prairie plots. One of the three plots was read immediately post-burn to determine burn severity of vegetation and substrate (litter and soil). Logistical reasons, the Sakakawea RX the following day, prevented the Fire Effects crew from reading immediate post-burns for the other two plots. Inclement weather prevented us from ever getting back to these plots for immediate post-burn re-reads. These plots, however, will be read 1, 2, 5, and 10 years after treatment of fire to determine the immediate, short, and long term ecological and vegetative effect fire had on this burn unit.

### **Conclusions**

The long-term health of ecosystems is the focus of the prescribed burning program in the Northern Great Plains therefore certain criteria need to be assessed. Long-term fire effects monitoring plots will be read at regular intervals to assess the change occurring within the burn unit.

Some objectives are immediately measurable such as severity immediate post-burn. Other quantifiable specific objectives need to be viewed over the course of several years before results can be determined. With a long-term ecological monitoring program in place, a quantifiable assessment of prescribed fires specific objectives can be made.

<b>Resource Objective</b>	<b>Monitoring Status</b>
Increase native grass and forb cover.	Fire effects plots will be read in the peak growing season 1,2,5, & 10 years postburn
Restore the natural role of fire to the ecosystem.	Fire effects plots will be read in the peak growing season 1,2,5, & 10 years postburn
Reduce fuels in the deciduous understory in the woody draws.	Fire effects plots will be read in the peak growing season 1,2,5, & 10 years postburn
Reduce 1-hr dead & down fuels in prairie by at least 70% immediate postburn	Visual estimates showed at least 50% of the thatch was removed